

Claim 64 stands objected to as not containing a full, clear, concise and exact written description of a reactive solution reacting with the first material.

CLAIM REJECTION - 35 USC 102.

Claims 1, 2 and 7 stand rejected under 35 USC 102(b) as being clearly anticipated by Kennel (US 5410166). Claims 1, 2, 4, 7, 23 and 24 stand rejected under 35 USC 102(b) as being clearly anticipated by Hatsopoulos and Gyftopoulos (H&G). Claims 1, 2, 8-16, 23, 24 and 27 stand rejected under 35 USC 102(e) as being clearly anticipated by DiMatteo (US 6084173). Claims 23 and 28 stand rejected under 35 USC 102(e) as being clearly anticipated by Rason et al (US 3843896). Claims 1, 2, 7-10, 13, 14, 23, 24, 27, 50, 53 and 61 stand rejected under 35 USC 102(b) as being clearly anticipated by Fitzpatrick et al ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat Pipe Isothermal Emitters"). Claims 23, 33 and 65 stand rejected under 35 USC 102(e) as being clearly anticipated by Cox (US 6064137).

CLAIM REJECTION - 35 USC 103(a).

Claims 3 and 43 stand rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Rason et al (US 3843896). Claim 5 stands rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Yasuda (US 5487790). Claim 17 stands rejected as being unpatentable over DiMatteo in further view of Cox (US 6064137). Claims 25, 26, and 54-56 stand rejected as being unpatentable over DiMatteo or H&G or Fitzpatrick. Claims 28-32 stand rejected as being unpatentable over Fitzpatrick in further view of Richards (US 4281280) and Edelson (US 5874039). Claims 29-32 stand rejected as being unpatentable over Rason in further view of Richards and Edelson. Claim 34 stands rejected as being unpatentable over Cox. Claim 36 stands rejected as being unpatentable over Cox in further view of Fitzpatrick et al. Claim 37 stands rejected as being unpatentable over Fitzpatrick (US 4667126) in further view of Fitzpatrick et al. Claims 44-47 and 49 stand rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Monroe (US 4040930) and Snyder (US 4224461). Claim 51 stands rejected as being unpatentable over Fitzpatrick et al and Richards. Claim 52 stands rejected as being unpatentable over Fitzpatrick et al and Sliwa (US5307311). Claims 44-47 and 49 stand rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Monroe (US 4040930) and Snyder (US

4224461). Claims 57-60 stand rejected as being unpatentable over Fitzpatrick et al and Richards. Claim 61 stands rejected as being unpatentable over Fitzpatrick et al and Cox, and Richards. Claims 67 and 68 stand rejected as being unpatentable over Cox.

REQUEST FOR RECONSIDERATION

The thermal interface has been cancelled from the claims. Applicant respectfully requests that Examiner withdraw the objection to the drawings under 37 CFR 1.83(a).

Claims 43-49, 63 and 64 have been cancelled, and Applicant respectfully requests that Examiner withdraw the objection under 35 USC 112.

Applicant acknowledges with appreciation that the Examiner has indicated that claim 6 is allowed, and that claims 35, 48 and 66 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims; however Applicant believes Examiner's objections to the base claim and intervening claims have been overcome.

No new matter is added by these amendments and cancellations and they are fully supported by the specification as filed. Applicant respectfully requests entry of these amendments and cancellations. Further, applicant respectfully requests that the Examiner reconsider the above-captioned patent application in view of the foregoing amendments and the following remarks.

CLAIM REJECTION - 35 USC 102(b) Kennel (US 5410166)

Claims 1, 2 and 7 stand rejected under 35 USC 102(b) as being clearly anticipated by Kennel (US 5410166).

In Office Action mailed 06/26/2002 and paragraph 31, Examiner states: "The free electrons tunnel from the diamond crystal emitters 116-126 to the anode across the air gap", and in paragraph 7 Examiner also states: "The electrons being tunnelled from the emitter to the anode104 across a small gap 110."

Applicant respectfully draws Examiner's attention to the Kennel document: in which there is no mention of tunneling. Kennel teaches that electrons are injected into the diamond material from the substrate (see column 2 lines 16-19; column 5 lines 42-46; column 8, 18-20). Kennel

also teaches that in NEA materials the conduction band level lies higher than the electron work function. Thus, any charge carriers present in the conduction band can be emitted by the surface of the material without the addition of more energy to the system (see column 2 lines 50-59). Thus, electron emission is not limited by the work function in materials of this type, but by the amount of electron charge carriers that can be injected into the NEA emitter material or p-type diamond. In other words, electron charge carriers (electrons) are injected from the substrate into the diamond material, and the amount of electron emission from diamond is governed by the amount of electron charge carriers that can be injected into it. Kennel therefore teaches that electrons are injected from the substrate into the diamond film, and are emitted from the diamond film into the inter-electrode space, and subsequently enter the anode.

Kennel does not teach that electrons tunnel from the substrate to the anode 104. In Applicant's invention, electrons tunnel from cathode to anode (emitter to collector).

In addition there is also no mention of an air gap anywhere in Kennel: Kennel, column 5 and lines 2, 24, teaches that the inter-electrode space 110 is to be filled with cesium vapor.

For a rejection under 35 USC 102, Examiner has to demonstrate that there is no difference between Applicant's invention and Kennel's invention.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

Verdegaa Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Applicant asserts that Examiner has not made such a case for claims 1, 2 and 7, because there is no element in Kennel corresponding to a "distance separating said emitter electrode and said collector electrode is sufficiently small for electrons to tunnel from said emitter electrode to said collector electrode", and respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 102(b) Hatsopoulos and Gyftopoulos

Claims 1, 2, 4, 7, 23 and 24 stand rejected under 35 USC 102(b) as being clearly anticipated by Hatsopoulos and Gyftopoulos (H&G).

In Office Action mailed 06/26/2002 and paragraph 8, Examiner's argument is that "It is inherent that the spacing between the electrodes is sufficiently small to allow for tunnelling."

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art."

Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

Examiner has not provided a basis in fact and/or technical reasoning to reasonably support the statement that it is inherent that the spacing between the electrodes is sufficiently small to allow for tunneling. First, tunneling is not mentioned in the extract of the article supplied by the Examiner. Secondly, the article by Hatsopoulos and Gyftopoulos is entitled "Vapor Thermionic Converters"; thermionic generators operate by thermal emission of electrons from an emitter surface into an inter-electrode space, and thence to a collector electrode. Examiner seems to be confusing the thermal emission process with tunnelling: thus, in paragraph 31, Examiner states "In order for the device of H&G to operate as a thermionic generator, it must be inherent that the spacing between the electrodes is sufficiently small to allow tunnelling of the electrons from the emitter to the collector". This is not the case at all. Applicant refers Examiner to the section in the Specification entitled Thermotunnel Converter for an overview of the tunnelling process. Thirdly there is no indication of the magnitude of the separation of the electrodes in the extract of the article furnished by the Examiner: how can it be therefore inherent that the electrodes are sufficiently close?

Failure of the Examiner to provide fact and/or technical reasoning supporting the assertion that it is inherent that the spacing between the electrodes is sufficiently small to allow for tunnelling renders the rejection of claims 1, 2, 4, and 7 under 35 USC 102(b) untenable, and Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

Examiner has provided no argument in paragraph 8 as to why claims 23 and 24 are rejected under 35 USC 102(b). In paragraph 31, Examiner states that "H&G show the emitter and collector having matching flat surfaces opposite each other".

For a rejection under 35 USC 102, Examiner has to demonstrate that there is no difference between Applicant's invention and H&G's disclosure.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

The H&G disclosure is simply a schematic representation of an experimental cesium diode with electronegative additive, and it does not provide express teaching that the emitter and collector have matching flat surfaces.

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

Failure of the Examiner to demonstrate that every element in claims 23 and 24 is expressly found in H&G, or failure to provide fact and/or technical reasoning supporting the assertion that it is inherent that "H&G show the emitter and collector having matching flat surfaces opposite each other" renders the rejection of claims 23 and 24 under 35 USC 102(b) untenable, and Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 102(c) DiMatteo

Claims 1, 2, 8-16, 23, 24 and 27 stand rejected under 35 USC 102(c) as being clearly anticipated by DiMatteo (US 6084173).

As noted above, for a rejection under 35 USC 102, Examiner has to demonstrate that there is no difference between Applicant's invention and DiMatteo's invention.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Applicant's invention comprises the element: "wherein said distance separating said emitter electrode and said collector electrode is sufficiently small for electrons to tunnel from said emitter electrode to said collector electrode", but in Office Action mailed 06/26/2002 and paragraph 9, Examiner provides no corresponding element in diMatteo. In paragraph 31, Examiner states: "In order for the device to operate as an energy converter, it must be inherent that the spacing between the electrodes is sufficiently small to allow tunnelling of the electrons from the emitter to the collector".

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art."

Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

Examiner has not provided a basis in fact and/or technical reasoning to reasonably support the statement that it is inherent that the spacing between the electrodes is sufficiently small to allow for tunneling. Energy converters do not in general rely on tunneling.

Failure of the Examiner to provide an appropriate argument renders the rejection of claims 1, 2, and 8-16 under 35 USC 102(b) untenable, and Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

Examiner has provided no argument in paragraph 9 as to why claims 23, 24 and 27 are rejected under 35 USC 102(b). In paragraph 31, Examiner states that "DiMatteo teaches the electrodes having matching flat surfaces".

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Examiner has not provided any indication as to where in the DiMatteo teaches the electrodes having matching flat surfaces. DiMatteo discloses "a heated surface emitter of radiation, including photons, is schematically shown at 1 in the form of a substantially planar hot surface at temperature T_H , juxtaposed in accordance with the present invention, in very close

proximity to a substantially parallel surface 2 of a semiconductor receiver of the radiation" (col 2 In 66 - col 3 In 1), but does not teach electrode pairs "wherein surface features of one electrode match surface features of the other electrode" either in an express or inherent manner.

CLAIM REJECTION - 35 USC 102(e) Rason

Claims 23 and 28 stand rejected under 35 USC 102(e) as being clearly anticipated by Rason et al (US 3843896).

As noted above, for a rejection under 35 USC 102, Examiner has to demonstrate that there is no difference between Applicant's invention and DiMatteo's invention.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

In Office Action mailed 06/26/2002 and paragraph 10, Examiner provides no corresponding element in Rason corresponding to "wherein surface features of one electrode match surface features of the other electrode."

Applicant notes that in paragraph 31 of the same Office Action, Examiner has stated that "The Applicant's argument that Rason does not teach matching flat electrodes is not persuasive because Rason teaches flat electrodes 264 and 296"; Examiner has not however provided an element in Rason corresponding to "wherein surface features of one electrode match surface features of the other electrode."

Failure of the Examiner to provide corresponding elements renders the rejection of claims 23 and 28 under 35 USC 102(b) untenable, and Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 102(b) Fitzpatrick et al

Claims 1, 2, 7-10, 13, 14, 23, 24, 27, 50, 53 and 61 stand rejected under 35 USC 102(b) as being clearly anticipated by Fitzpatrick et al ("Close-Spaced Thermionic Converters with Active Spacing Control and Heat Pipe Isothermal Emitters").

In Office Action mailed 06/26/2002 and paragraph 11, Examiner states "It is inherent that the electrodes are space sufficiently small to allow electron tunnelling therebetween to allow the device to operate as a generator".

"In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art."

Ex parte Levy, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990)

Examiner has not provided a basis in fact and/or technical reasoning to reasonably support the statement that it is inherent that the spacing between the electrodes is sufficiently small to allow for tunneling. Fitzpatrick teaches a thermionic generator, not a thermotunneling generator.

Failure of the Examiner to provide an appropriate argument renders the rejection of claims 1, 2, 7-10, 13, 14, 50, and 53 under 35 USC 102(b) untenable, and Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

In Office Action mailed 06/26/2002 and paragraph 11, Examiner states "Fitzpatrick teaches a thermionic generator with matching emitters and collectors having flat surfaces". In fact, Fitzpatrick teaches "In order to operate a converter with a gap spacing of < 10 microns, it is necessary to have the electrode surfaces very flat and smooth" (page 1, column 2, lines 10-12). The present invention discloses a method for fabricating a pair of electrodes in which minor variations in the surface of one electrode are replicated in the surface of the other. This process is described on page 26 lines 3 and following, in which a method is disclosed for producing pairs of electrodes having substantially smooth surfaces in which any topographical features in one are matched in the other. Fitzpatrick does not teach that surface features of one electrode match surface features of the other electrode.

Failure of the Examiner to provide an appropriate argument renders the rejection of claims 23, 24, 27, and 61 under 35 USC 102(b) untenable, and Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 102(b) Cox

Claims 23, 33 and 65 stand rejected under 35 USC 102(e) as being clearly anticipated by Cox (US 6064137).

In Office Action mailed 06/26/2002 and paragraph 12, Examiner states "Cox clearly teaches two opposing electrodes with matching surfaces and having a second removable material which is removed by a solution and vacuum". The present invention discloses a method for fabricating a pair of electrodes in which minor variations in the surface of one electrode are replicated in the surface of the other. This process is described on page 26 lines 3 and following, in which a method is disclosed for producing pairs of electrodes having substantially smooth surfaces in which any topographical features in one are matched in the other. Cox does not teach that surface features of one electrode match surface features of the other electrode.

"A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference."

Verdegaal Bros. v. Union Oil Co. of California, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Failure of the Examiner to provide an appropriate argument renders the rejection of claims 23, 33, and 65 under 35 USC 102(b) untenable, and Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 H&G, Kennel, Fitzpatrick or DiMatteo in further view of Rason et al (US 3843896)

Claims 3 and 43 stand rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Rason et al (US 3843896). Applicant has argued above that H&G, Kennel, Fitzpatrick or DiMatteo do not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 H&G, Kennel, Fitzpatrick or DiMatteo in further view of Yasuda (US 5487790)

Claim 5 stands rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Yasuda (US 5487790). Applicant has argued above that H&G, Kennel, Fitzpatrick or DiMatteo do not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 DiMatteo in further view of Cox (US 6064137)

Claim 17 stands rejected as being unpatentable over DiMatteo in further view of Cox (US 6064137). Applicant has argued above that DiMatteo does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 DiMatteo or H&G or Fitzpatrick

Claims 25, 26, and 54-56 stand rejected as being unpatentable over DiMatteo or H&G or Fitzpatrick. Applicant has argued above that DiMatteo and H&G do not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Fitzpatrick in further view of Richards (US 4281280) and Edelson (US 5874039)

Claims 28-32 stand rejected as being unpatentable over Fitzpatrick in further view of Richards (US 4281280) and Edelson (US 5874039). Applicant has argued above that Fitzpatrick does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Rason in further view of Richards and Edelson

Claims 29-32 stand rejected as being unpatentable over Rason in further view of Richards and Edelson. Applicant has argued above that Rason does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Cox

Claim 34 stands rejected as being unpatentable over Cox. Applicant has argued above that Cox does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Cox in further view of Fitzpatrick et al

Claim 36 stands rejected as being unpatentable over Cox in further view of Fitzpatrick et al. Applicant has argued above that Cox does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Fitzpatrick (US 4667126) in further view of Fitzpatrick et al

Claim 37 stands rejected as being unpatentable over Fitzpatrick (US 4667126) and Fitzpatrick et al. Applicant has argued above that Fitzpatrick et al does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 H&G, Kennel, Fitzpatrick or DiMatteo in further view of Monroe (US 4040930) and Snyder (US 4224461)

Claims 44-47 and 49 stand rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Monroe (US 4040930) and Snyder (US 4224461). Applicant has argued above that H&G, Kennel, Fitzpatrick or DiMatteo do not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Fitzpatrick et al and Richards

Claim 51 stands rejected as being unpatentable over Fitzpatrick et al and Richards. Applicant has argued above that Fitzpatrick et al does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Fitzpatrick et al and Sliwa (US5307311)

Claim 52 stands rejected as being unpatentable over Fitzpatrick et al and Sliwa (US5307311). Applicant has argued above that Fitzpatrick et al does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 H&G, Kennel, Fitzpatrick or DiMatteo in further view of Monroe (US 4040930) and Snyder (US 4224461)

Claims 44-47 and 49 stand rejected as being unpatentable over H&G, Kennel, Fitzpatrick or DiMatteo in further view of Monroe (US 4040930) and Snyder (US 4224461). Applicant has argued above that H&G, Kennel, Fitzpatrick or DiMatteo do not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Fitzpatrick et al and Richards

Claims 57-60 stand rejected as being unpatentable over Fitzpatrick et al and Richards. Applicant has argued above that Fitzpatrick et al does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Fitzpatrick et al and Cox, and Richards

Claim 61 stands rejected as being unpatentable over Fitzpatrick et al and Cox, and Richards. Applicant has argued above that Fitzpatrick et al does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CLAIM REJECTION - 35 USC 103 Cox

Claims 67 and 68 stand rejected as being unpatentable over Cox. Applicant has argued above that Cox does not teach every aspect of the invention, and therefore the 35 USC 103(a) rejection is not tenable. Applicant respectfully requests that Examiner's objections to these claims be withdrawn.

CONCLUSION

Applicant respectfully submits that this application, as amended, is in condition for allowance, and such disposition is earnestly solicited. If the Examiner believes that discussing the application the Applicant over the telephone might advance prosecution, Applicant would welcome the opportunity to do so.

Respectfully submitted,



Avto Tavkhelidze
Inventor

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